28. ENGLISH.
[118] Wind Mills.
CLASSIFICATION
DIVISION.

BENJAMIN DEARBORN'S DOUBLE CENTRE'D MILL.

First sheet.

Patented 30th April. 1799.

FIG. 1.

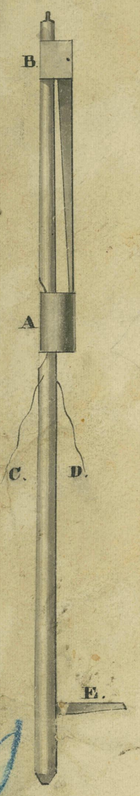


FIG. 2.

FIG. 3.

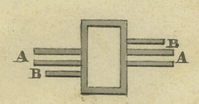


FIG. 4.

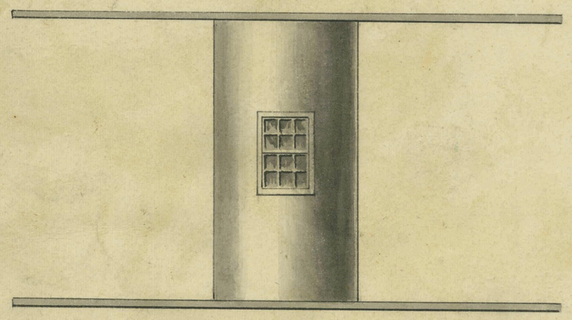


FIG. 6.

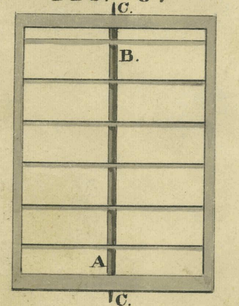


FIG. 5.

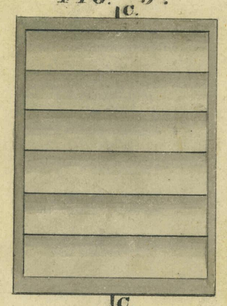


Fig. 1. The shaft of the mill, with the excentric circle **A.** hanging by a pin between two pieces, on the upper part of the shaft, one of which is seen at **B.** **C.D.** are 2 cords, which pass through the shaft, and are made fast to the excentric circle, on opposite sides. **E.** is the lever by which the shaft is turned.

Fig. 2. Represents the shaft, constructed with a fane **A.** whereby the wind turns the excentric circle **B.** round a pin, or rod, which has a shoulder at **G.** to support the weight of the dome.

Fig. 3. Is one of the directing frames; the spaces **A.A.** slide on pieces within the dome, and prevent the frame from turning. The spaces **B.B.** receive the pendant pieces, to which the frame is hung, and to which the leaders are attached; this frame lies horizontally in the dome.

Fig. 4. Is a representation of the dome and arms; shewing only one pair of arms on each side, to prevent confusion in the figure.

Fig. 5. Is a front view of one of the wings, with the leaves shut.

Fig. 6. Is a front view of one of the wings, with the leaves open.

A.B. is the piece on the wing, which opens the leaves.

C.C.C.C. are pinions, on which the leaves turn.

FIG. 7.

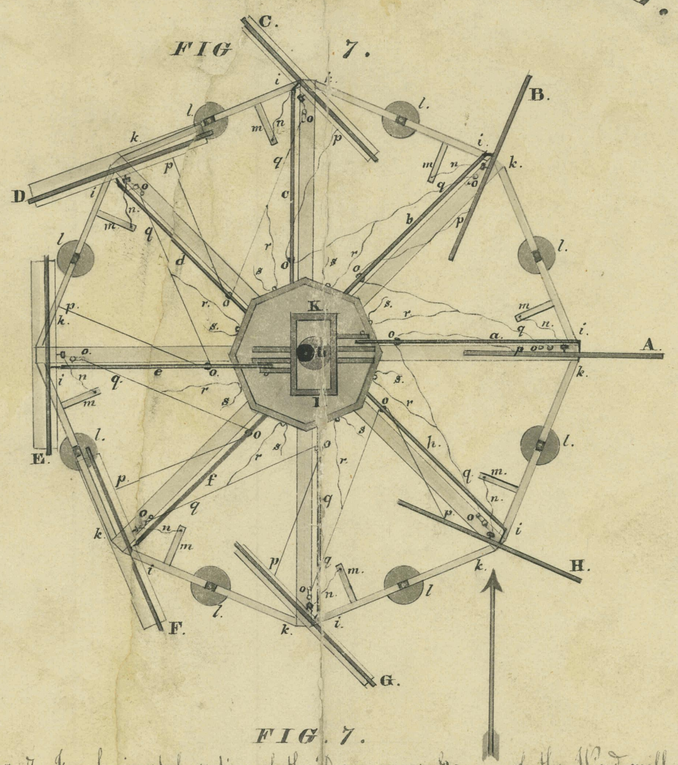


Fig. 7. Is a horizontal section of the Dome, arms, &c. of the Wind-mill; the arrow shewing the course of the wind. The position taken by each wing, in the revolution of the mill, is shown by the thick black lines **A.B.C.D.E. F.G.H.** the order of which describe the motion of the mill; but it can as easily be constructed to revolve the contrary way. The leaders, which give the wings their positions, are shown by other thick black lines **a.b.c.d.e. f.g.h.** the leaders are forced outward on one side of the Mill, and drawn in on the opposite, by the directing frames; one of which, only, (to avoid confusion in the figure) is shown, at **K.** which, by turning round the excentric circle **L.** forces outward the leader **a.** and draws in the leader **e.** whereby the wing **A.** is turned, with its broad surface, and the opposite wing **E.** with its edge, to the wind. The small black circle, in the centre, is the shaft, round which the Mill turns. The pieces **i.k.** are axles, to which are suspended the centrifugal regulators, or weights **l.** by a bar, the end of which is represented, by a square shade, in the centre of the circular weights **l.** This bar might be made sufficiently heavy to answer the purpose without weights. From the axles are extended short pieces marked **m.** which, by the lines **n.** open the leaves of the wings, when the regulators are thrown outward to a certain degree, by the velocity of the Mill. Pullies, or sheaves are represented, on the leaders, and on the arms, at **o.** round these sheaves, the lines **p.o.q.** are passed, which being fastened at the end **p.** to the wing, and at the end **q.** to the leaves of the next wing; open all those, which if shut, would produce resistance in the revolution of the wheel. Thus, the leaves of the wing **C.** are seen just opening; those of **D.** quite open; those of **E.** beginning to close; those of **F.** nearly closed; and all the others quite closed.

The lines **r.s.** are connected with those last mentioned, and are designed to lead through the dome, into the lower part of the Mill; these are to be drawn down, and made fast, when the Mill is stopped, whereby the leaves will be all opened, and the Mill will be secured from moving. The cords, or lines, above described, may be exchanged for chains, wires, straps, thongs, webbing, or any material which will turn round a sheave or pulley; and those parts which do not turn round the sheave, may be supplied by bars of wood or metal. Some of the motions may, also, be produced by angular sweeps, in the manner house bells are hung, or by axles, and arms, as the regulators are fixed; but cords and pullies are simplest.

FIG. 8.

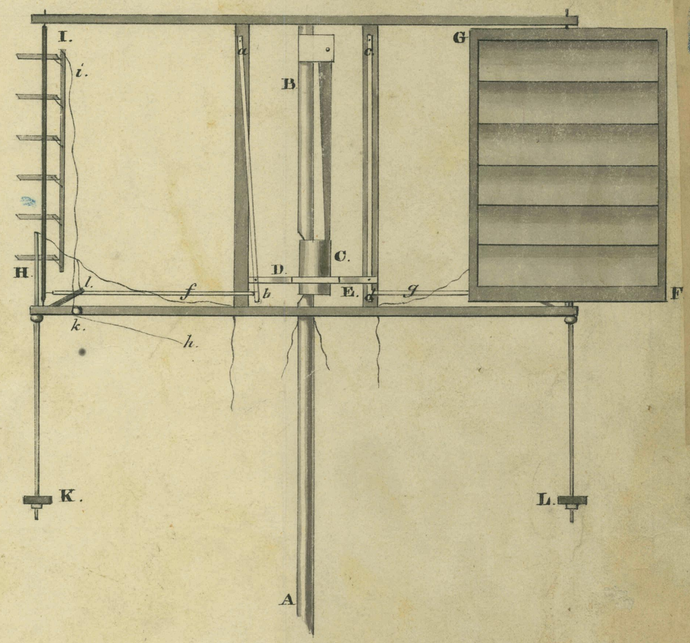


Fig. 8. Is a perpendicular section of the Wind-mill, shewing only two of the leaves; the others being omitted, to avoid confusion in the figure. **A.B.** is the shaft; **C.** the centrifugal circle. **D.E.** one of the directing frames, supported by the two pendant pieces **a.b.** and **c.d.** to which the leaders **f.** and **g.** are attached, giving motion to the two opposite wings; the wing **F.G.** being thereby turned to face the wind, and the wing **H.I.** having its edge to right to the wind. The wing **H.I.** has its leaves opened by the line **h.i.** every time the Mill revolves, this line communicating with the next leader, and wing; and passing the sheave or pulley **k.** The leaves are, also, opened whenever the velocity of the Mill is too great, by the centrifugal power of the regulators **K.L.** from which, lines made fast to the short arm **l.** and to the line before mentioned, are drawn downward, and open the leaves, when the regulators are thrown outward to a certain degree.

The pendant piece **c.d.** hangs on the opposite side of the post, although drawn on this side; as it could not be represented on the other.

The above representation exhibits only one wing between each opposite pair of arms; but the arms may be extended; and any required number of wings may be placed between them; all being turned by the same machinery within the dome.

Drawing Detached 66

3d sheet

80 April 1799.

CLASSIFICATION
247-4
DIVISION.

Horizontal.

Third, and last sheet.

B. D & A. BORN?S

DOUBLE CENTRE'D MILL.

FIG. 13.

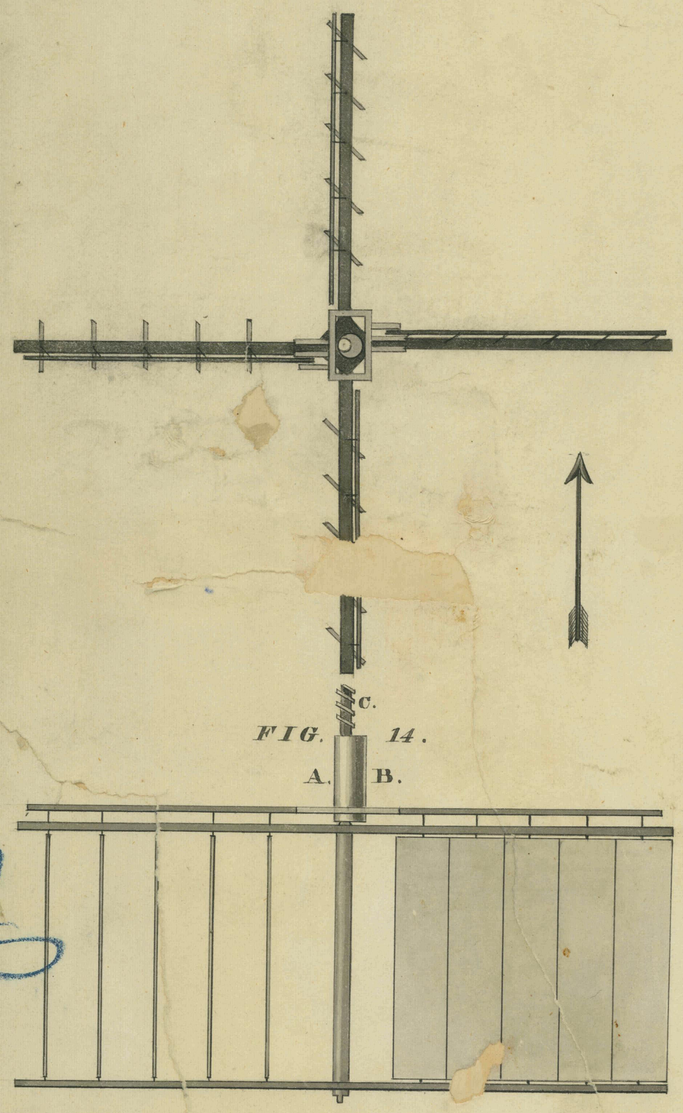


FIG. 14.

FIG. 13.

Fig. 13. Is a section of a Mill, upon a simple construction, of the foregoing principles, for water, or for the draught, or smoke of a chimney; but without regulators. If considered as a water wheel, it is a horizontal section; if as a wheel for a smoke-jack, it is a perpendicular section. In this wheel, the arms are made fast to the shaft, which turns with the arms; the excentric circle, and the directing frames, being out-side the arms. But one of the directing frames is here shown, to a-void confusion in the figure. The arrow shows the course of the flow-er which turns the wheel. The excentric circle is to be fixed, or movable, as the case may require; but if the power constantly acts in one direction, it may be fixed for that side which the power requires; but whether fixed, or moveable, the shaft passes through, and turns it.

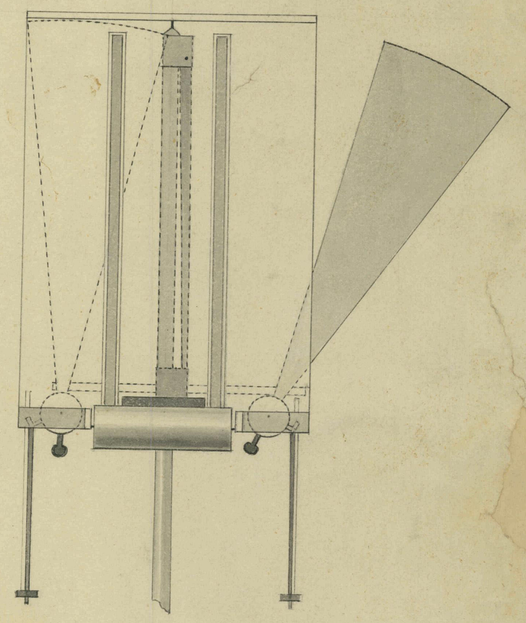
This wheel may be made with any required number of arms; and leaves; the parts of which are so nearly similar to those of figure 11. that they do not require a particular description.

FIG. 14.

Fig. 14. Is the other section of the Mill fig. 13. If considered as a smoke-jack, it represents the under side, when fixed in the chimney; the excentric circle **A. B.** being fixed in the brickwork; and the shaft passing through it; on the end of which is the perpetual screw. **C.** for turning a wheel, on the breast work; with which the spit communicates, by a chain, or otherwise; or, instead of the screw, a wheel might be fast on, with a groove in it, for the chain, when the interior form of the chimney throws the wheel over one side of the fireplace.

If this figure be viewed as a water-wheel, it is a perpendicular section; the shaft passing up, through the excentric circle; and to be continued as high as necessary; upon which is fixed a stone, for grinding; or a wheel, for turning other machinery, or both.

To avoid confusion, but two of the arms are shown in this figure, with their leaves; which are open, on one side; and shut, on the other; the leaves being turned by pieces outside the arms; which are fastened to the directing frames, as shown in figure 13.



NB. This Diagram had neither Figure, or References.

In the foregoing figures, but few of the variations are shown to which the principles are applicable; as they admit of unlimited variety. To this I subscribe, as Inventor of the Machines; and author of the descriptions, and Specifications herein given.

Benjamin Dearborn.

2d sheet

Patent 30 April 1799

98. PNEUMATICS.
[118] Wind Wheels.
Horizontal

Second sheet.

CLASSIFICATION
247 - 4mt
DIVISION.

B. DEARBORN'S

DOUBLE CENTRE'D MILL.

FIG. 9.

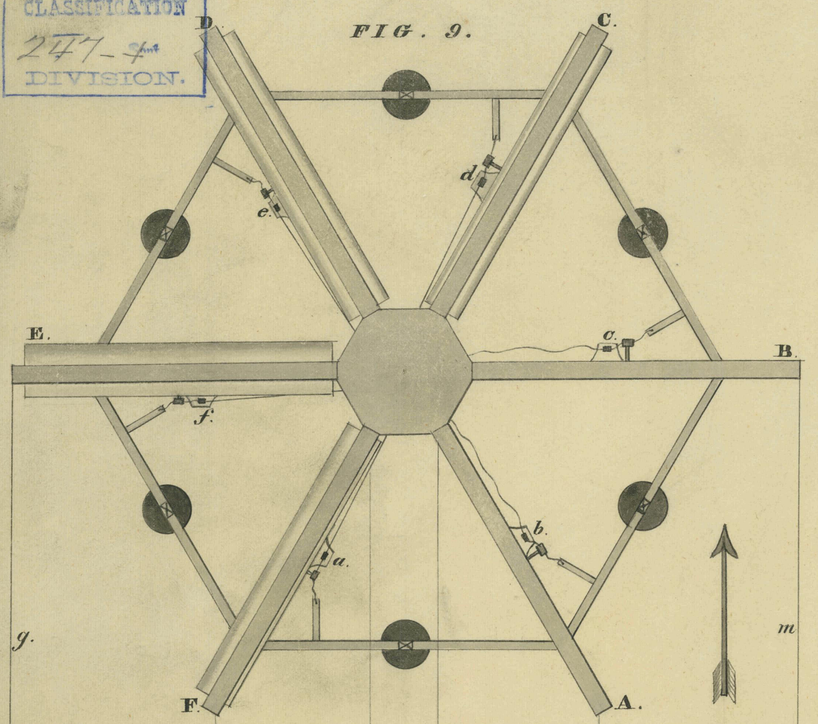


FIG. 10.

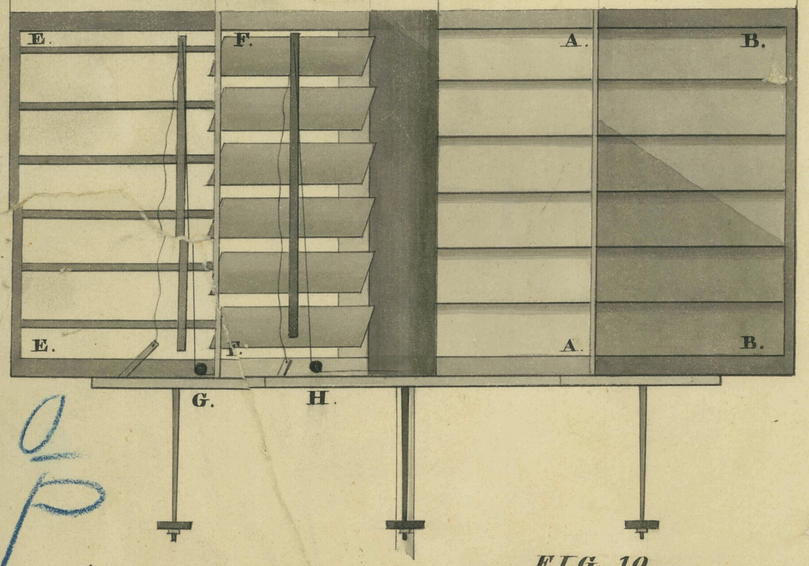


Fig. 10. Is a perpendicular section of the Mill shown in figure 9. The lines g.h.i.k.l.m. showing the parts of the two figures which correspond with each other. The wings **B.B.** and **E.E.** are, partly hidden by the wings **A.A.** and **F.F.** which, standing obliquely, are foreshortened in the figure. Two circular black spots, over **G.** and **H.** represent the sheaves, over which the lines, or cords pass; which communicate with the Machinery, within the dome. The excentric circle; and the directing frames, being similar to those, before described, are not here represented. The manner of hanging the axles, to which the regulators are suspended, could not be shown in the figure; they may be hung in the sides of the arms; or, in pieces nailed on the arms; or, in staples, driven into the under part of the arms; or, in any other way, more convenient; they may, also, turn on pins, or on their ends being made round. But three, of the six regulators, are shown, in this figure; the other three being supposed to be hidden, behind those. The pieces on the back of the leaves, which are drawn downward, to open the leaves, are, in all these figures, represented as made of wood; but they may be made of cord, strapt, wire, or of Metal bars, or sheets.

FIG. 9.

Fig. 9. Is a horizontal section of a Mill, with only six wings, as the number may be varied, at pleasure. The wings are formed with leaves turning on horizontal axles; but they do not turn on perpendicular axles, as those of fig. 7. all of them being on a line with the arms, in all parts of the revolution, with one pinion of each leaf resting in the side of the dome; and the other in a perpendicular piece, fastened to the extremity of the arms. The leaves are formed as those of Fig. 7. One shutting against another, by their own weight. They are opened by lines, communicating with the machinery within the dome; which machinery is similar to that before described; these lines pass through pullies, or sheaves, fastened on the arms, by pieces, represented at a.b.c.d.e.f.

The arrow shows the course of the wind; and the leaves of the arms **A.** and **B.** are shut, facing the wind, and receiving its power. The leaves of **C.** are just opening; the leaves of **D.** and **E.** are quite open; and the leaves of **F.** are just closing. The centrifugal regulators are fixed as before described; and operate in the same manner; therefore they need not a description here.

FIG. 11.

Fig. 11. Is a horizontal section of a Mill, with perpendicular leaves, and only four pair of arms; which number, as, also, the number of leaves, may be increased, or diminished, if the constructer chooses. The arrow shows the course of the wind; the leaves on the arm **A.** being shut, facing the wind, and those opposite, on the arm **B.** being quite open. The leaves on the other arms appear at an angle of forty five degrees with the arm, those on **C.** being opening; and those on **D.** closing. The leaves opposite to those which receive the power of the wind, are opened by machinery within the dome, similar to that before described, which draws the cords, chains, or straps **a.b.** **c.d.** beside which, there are others, to draw the leaves open, when the Mill is stopped; which may be done by a friction bar, or band, rubbing against the cog wheel. The leaves are, also, opened, when the velocity of the Mill is sufficient, by the centrifugal power of the regulators; as will be better described, in Figure 12; and they are shut by the weight, or gravity, of the same regulators, when the centrifugal power is reduced.

The braces **A.C.** **C.B.** **B.D.** and **D.A.** are added, to brace the arms; and to receive pieces, shown in Fig. 12. in which one end of the axles are hung that support the regulators; these braces may be nearer the centre; but the power of the regulators will, then, be less. A direction is given to this Mill, the contrary of that shown before; as may be seen by the figure; the principles being applicable to a motion with the course of the sun, or against it. The pieces **e.f.g.h.** are axles, to which the regulators are attached; only two of these axles are seen in the next figure. The four circular black spots, marked **i.k.l.m.** partly seen, near the ends of the arms, are the regulators; which are seen in the next figure, each marked by the same letter. The thick black lines **A.a.** **B.b.** **C.c.** and **D.d.** are horizontal bars; which communicate with the leaves, and open them, by means of a piece, turning on a centre, shown in figure 12. which is fastened to the bars, at its upper end. **N.B.** The excentric circle of this Mill; as well as all the others; may be made to turn with the wind.

FIG. 11.

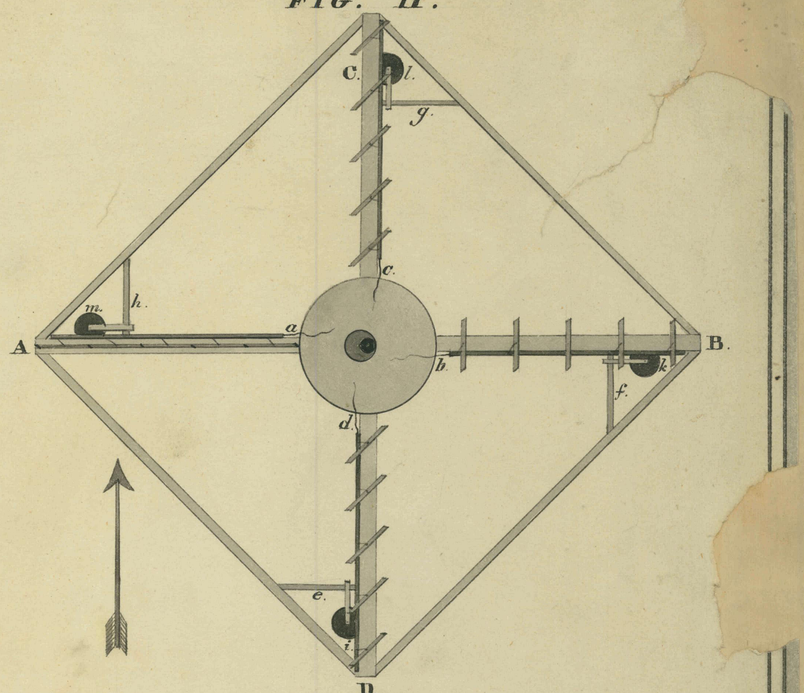


FIG. 12.

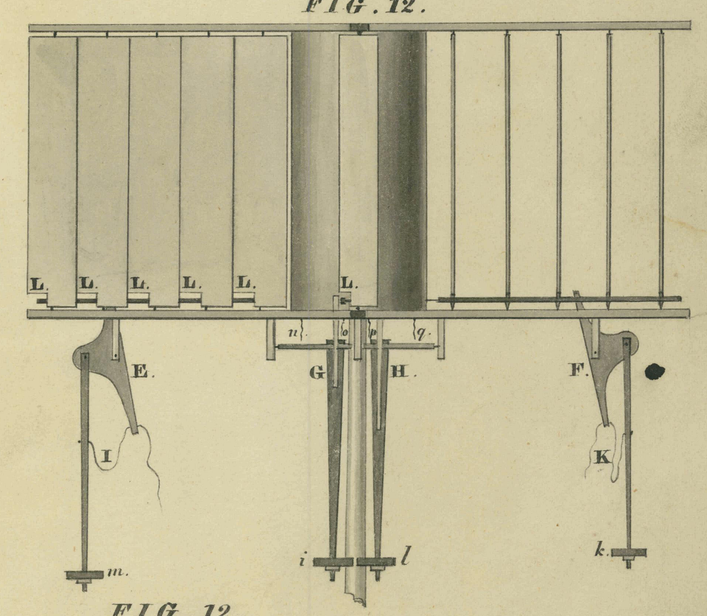


Fig. 12. Is a perpendicular section of the Mill above described; in which are shown the leaves of the arms **A.** and **B.** of Figure 11. and one leaf of the arm **D.** the other leaves being hidden behind it. In this figure, the manner of affixing the centrifugal regulators is more clearly shown, than it could be in the last figure; it is as follows — **E.** and **F.** represent two pieces, seen sidewise; which, for distinction, I denominate Buttons; they may be made solid, as represented in the figure; or may be made with frame work. Each regulator hangs on a pin, which passes thro' the button near its edge; through a hole near the opposite edge; an axis is passed; with which the button turns. The axis hangs in two pieces projecting downward; one in the arm, and the other in the brace; as seen at **G.** and **H.** where two opposite regulators are shown. The top of each button communicates with one of the horizontal bars, which open the leaves, by a cord, or otherwise. Toward the bottom of the button is another cord, or chain &c. which is made fast to the bar of the regulator; and is seen, hanging loose, at **I.** and **K.** By the length of this cord, or chain, is determined the angle at which the regulators shall begin to open the leaves; the cord is, therefore, passed through a hole, in the button; to be lengthened, or shortened, at pleasure. Thus, the regulators operate by two powers; their gravity, or weight, shutting the leaves, until their centrifugal force opens them. At **L.** in each leaf, is seen a notch, cut out of the corner, for the convenience of bringing the bar, which opens them, nearer to their centre than it could, otherwise, be, unless the whole leaf was shortened. Four cords, are seen at **n.o.p.q.** which pass through the dome, to the lower part of the Mill, to stop it, by drawing all the leaves open.

3 Sheets—Sheet 1.

247x

B. DEARBORN.

WINDMILL.

Patented Apr. 30, 1799.

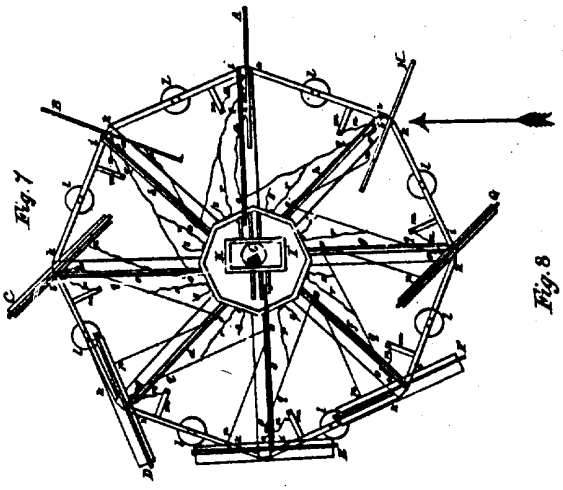


Fig. 1

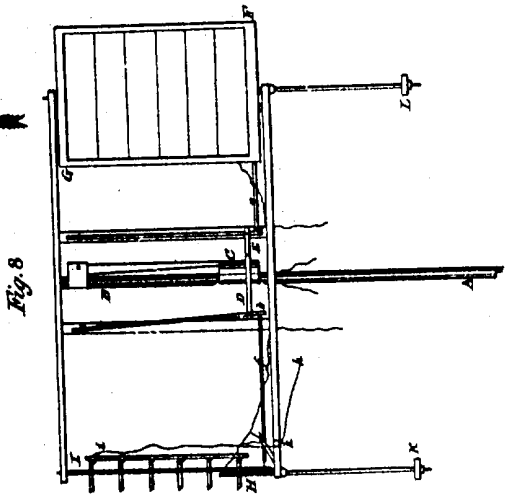


Fig. 8

Fig. 3

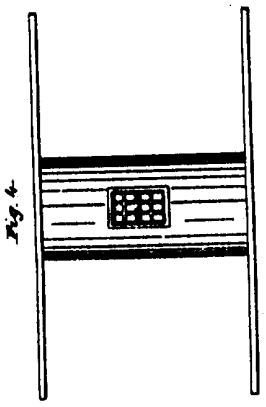


Fig. 4

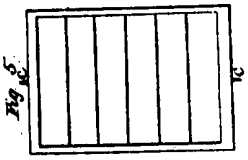


Fig. 5

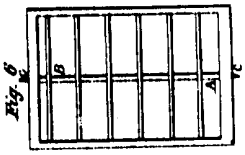


Fig. 6

Fig. 2

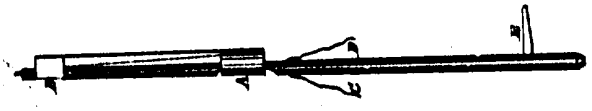


Fig. 7

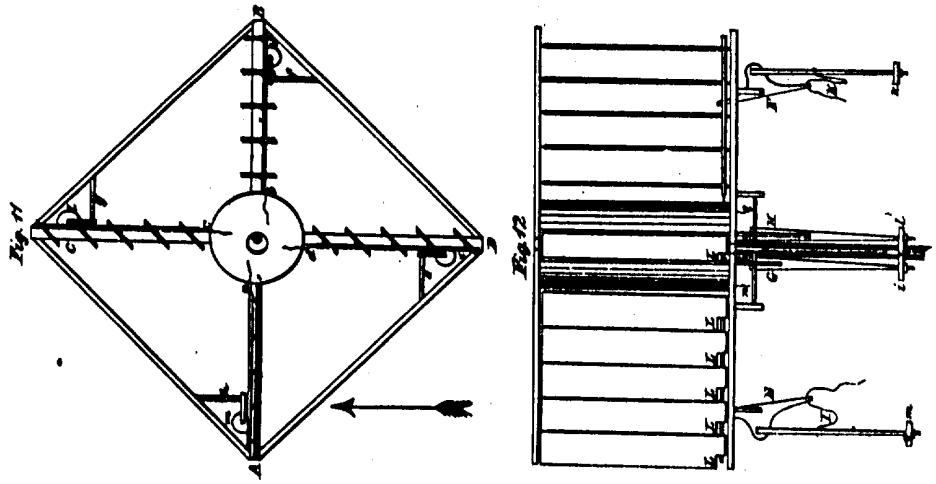
247y

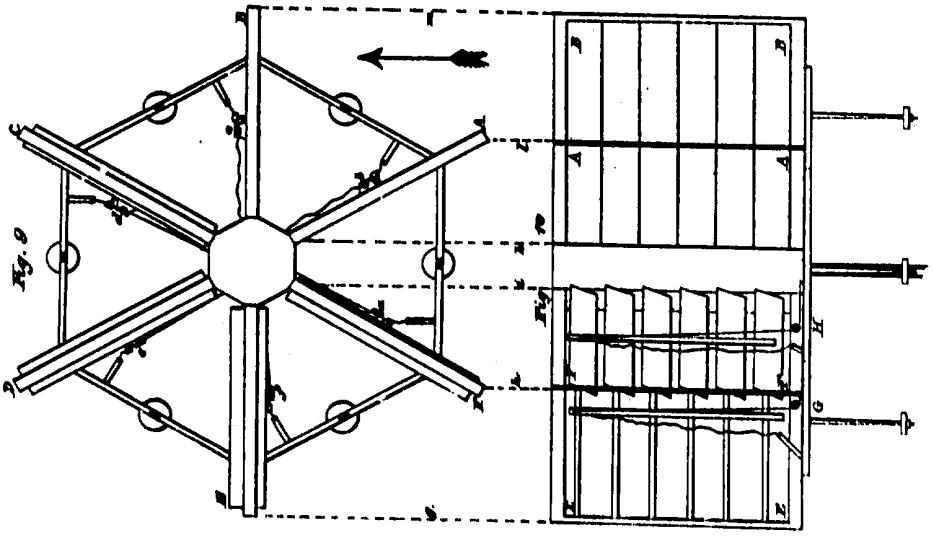
3 Sheets—Sheet 2.

B. DEARBORN.

WINDMILL.

Patented Apr. 30, 1799.





No Printed Specification Available

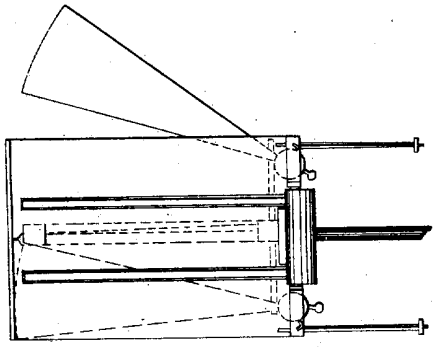
247X

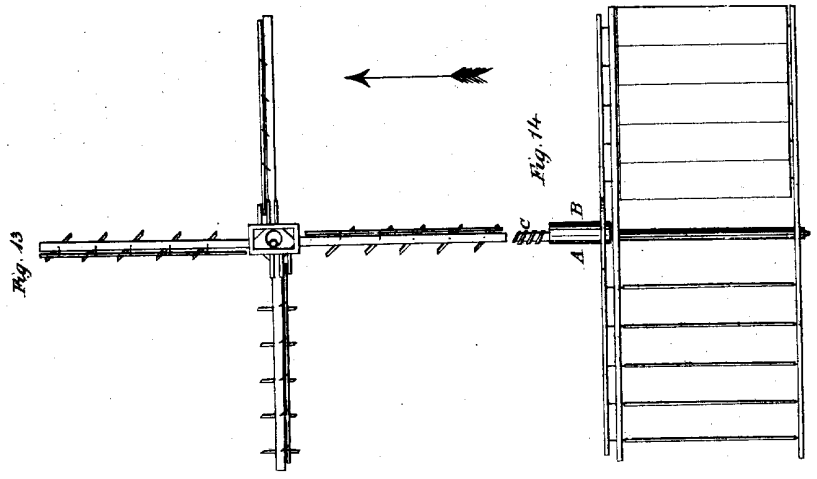
3 Sheets—Sheet 3.

B. DEARBORN.

WINDMILL.

Patented Apr. 30, 1799.





THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

Benjamin Dearborn Hopkinton [illegible] 4/30/1799

Letters Patent Dated March 26. 1799.

The Schedule referred to in these Letters Patent and making part of the same containing a description in the words of the said Benjamin Dearborn of his improvement being a double action Mill for wood or metal with certain rules for adjusting the balance of the Mill or shearing wheels

The annular conical Pinion A horizontal wheel C and a disk or double conical Pinion B are fixed on one shaft or axis and turned on centres each embracing or the ends of a double conical pivot constituting the shaft. The centres each is so constructed as to be moved upon the axis of the shaft until the [illegible] thereby to nicely coincide with the centre of the shaft when the mill is in motion. When the mill is to be stopped the annular circle of brass back until its centre coincides as nearly as possible with the centre of the shaft. This circle is then secured for common purposes without turning round the shaft and so turned as to that side which the wood upon. The shaft is made to turn upon its centres by means of a lever fixed in the centre post so that when the shaft is turned the annular circle is turned with it. This lever may be put in on any side of the shaft but that side is the best which opposes the lever to be turned steadily towards that quarter from which the wind blows. If the shaft should turn so easily as to be moved by the friction of the mill in its annular centres it may be prevented by inserting between between the faces of the frame work of a few wooden pins or setting the two annular circles closely together to the shaft thereby it may not depend the sides of the circles touching the collars or the lever may be made to be fixed by screws in any part of its revolution or it may fall into notches like the bills of some small vessels and so fixing &c. or a chain with dogs may be used the shaft with its pinions or handle head to be used. The annular circle is moved by the cords or ropes which pass through the shaft and down on opposite sides of the lower part of the mill. This circle may be made to slide on pieces fixed horizontally on the shaft or it may consist of two of the bars the other and fastening as in hinges or pins as in the annular and the circle may be fixed at the shafts or lower ends of the bars but for common purposes

15 247 X

it is most convenient at the [illegible] from the construction above described, the eccentric circle answers all the ends of its invention as well for common purposes erected on land or in a boat, but for [illegible] purposes as when a mill is required to be in motion at all times when the wind blows the eccentric circle must be so constructed as to be turned by a fane or weathercock. This may be done by affixing the circle to one side of the shaft and confining the fane to the shaft in such a manner as that the shaft will be turned by the wind. But a better method of constructing it is to make the eccentric circle [illegible] with a groove in the center of the top of the shaft, and connected with one side of the periphery of the eccentric circle, which side must be above the shaft and then, and on the top of this wing first the fane must be so fixed that when turned to the leeward or directly from the wind the eccentric circle may give that position to the wings which will give the greatest power to the mill. For a water Mill in a stream constantly running one course, the eccentric circle must be moveable on one side of the shaft in the manner first above mentioned but need not turn. If the stream runs both ways as in tide mills the eccentric circle must be made to turn by hand occasionally or to turn by the tide as in the above description it turns by the fane. A mill constructed with a fane in the manner above described will at all times be in a proper position for the wind or water when their power is sufficient to give it motion, and during the continuance of the power will be constantly at work without attendants for raising water or any other purpose to which it may be applied. The eccentric circle above described may be applied in various ways to the purpose of increasing a power on one side of a wheel and reducing it on the other, for example the wings of a mill or paddle boards of a water mill may be turned on a horizontal axis, or they may be thrown out on one side and drawn in on the opposite, or they may be raised on one side and depressed on the opposite with other variations by this invention. But in whatever manner the eccentric circle may be applied to mills or works, the author of this description considers the right of the invention as vested in him, as it has never been before to his knowledge [illegible] applied to mills or works, and he truly believes himself to be the original inventor of this power in such application of its uses, and further he believes that if it is the will of the great Author of motion to indulge his

Machine with the drawing and length of that which is the most perfect and best. That the exactness which must be the means which shall lead to the longest but hitherto unattained desideratum. The use of the exactness made use of is applied in the model is to save the wings of the mill a circular motion of ninety degrees. whereby they are turned with their broad surfaces to the wind on their side of the wheel which carries the power. and with their edges to the wind on the opposite side of the wheel. thereby making on that side the least possible resistance while there between take an oblique direction to increase the power of the wheel. all the wings turning in rotation the position above described. Of the directing frames. Round the exactness circle are placed directing frames their number being equal to one half the number of wings in a wind mill or float boards in a water mill. These frames are so constructed as to have in the centre a space in the form of a parallel square. The breadth of this space is very little more than the diameter of the exactness circle. its length is nearly three of breadth. These frames are strengthened by pendant pieces to each frame. in such a manner that the frames leaning from each side of the frame in their turning each other. This motion being produced by their turning round the exactness circle is communicated to the wings or float boards by means of thought pieces which may be called leaders. These are united at one end to the frame or to the pendant pieces which support the frames and at the other to the wing or float board. Each frame has two of these leaders attached to it thereby giving the proper position to two opposite wings or float boards in all parts of their revolution and in magnitude. The wings or floats may be more numerous each directing frame turning four. six. eight or more wings or floats. The directing frames are governed & turning in circular motion by a notched rim in the opposite extremities which slide on a pin or pivot fixed on the frame. Of the Exactness circle. The frame is made of any required length with just sufficient breadth for the meeting frames and their motion. It may be made square or any other figure as fancied. the shaft passing through its centre. From one end of this frame are extended any number of arms which may be framed diagonally or crossed in the middle they are eight. From the other end of this frame are extended a number of arms and extended parallel to

the others and in the same direction. The arms may be of any required length each pair containing one or more rings on flood Boards. or the rings may each be made in multangular forms agreed to the arms. Under the bottom of the Frame a cog wheel is to be fixed for giving motion to the machinery of the mill below when the work is to be done which the mill is designed for. Of the rings. The rings of a double conical mill designed for the wood account of a frame in the form of a square or parallelogram, containing a number of lines sufficient to fill or nearly fill the frame; the frame with its lines somewhat resembling a venetian blind. Each ring bears on two pivots resting on the sides of the frame, forming an axis. This axis is a little above the centre of the gravity in the lines. The lower part of the lines being a little heavier than the upper. The edges of the lines are made sloping, the bottom of each leaf shutting against the top of the next below in such a manner, as that when all are shut there forms on that side which is assigned to form the conical surface. The lines are shut by three wires caught and opened by lines communicating with the outside of the frame, and also by lines communicating with the leaders. They are also opened by the wind or by any force applied on the back of them. Each leaf has a pin on the back by which it is opened. in the model three pieces are required. every all arranged on a line communicate with perpendicular pieces of wood which opens all the lines together when drawn downward. Instead of making the mill [illegible] from side to side of the frame as in the model. it may be best to have the frame of the rings made with a perpendicular piece in each corner and the lines of each ring in like situation in each other. by the pieces. These two sets of lines may be opened by one piece communicating with both or with two pieces as the construction shows. or a perpendicular piece may be put in or near the centre of the frame and the lines will be made as long as the breadth of the frame. The lines above described may be made of slips of wood with edges to prevent their warping. or with frames covered with cloth or any other light durable material. or even with thin sheets iron or other metal. The float Boards of a water mill may be

[illegible] cord round a pulley [illegible] as often described. It may be made with different [illegible] lines of the resistance required may be readily [illegible]. The resistance being in a great measure [illegible] by the thickness of the lines which [illegible] is applied on the back of them. [illegible] The centrifugal regulator. The centrifugal regulator is applied [illegible] The centrifugal regulator is usually employed to moderate the velocity of machinery which is too great, in such a manner as to destroy it by [illegible] the machinery. They are chiefly derived from the centrifugal force produced by the rotatory motion of the wheel. This power increases according to the velocity of the wheel. A communication is made from the regulator to the thing which is to be [illegible] by the wheel, or other machinery which should increase its velocity when the centrifugal force decreases and the regulator to decrease its power when they open from the wheel, through them. The degree of velocity at which the governor balls open, is determined by the length of the cord or chain which opens them, and this is lengthened or shortened by the workman at the wheel as he should find occasion. And when exactly applied will rarely require altering. The number of regulators may be equal to the number of wings. Or one regulator may be made to open two or more wings. The regulator may also be made by the application of the centrifugal force in various ways, as by means of balls confined in any curves, or by fluids &c in tubes. But weights are most simple and readily applied. This power may also be applied to either side of the wing, but it is most convenient on the back. The author of this description knows of no instance in which the centrifugal force has heretofore been applied to any purpose except the movement of the governors in philosophical experiments. Of which application to the wings of a windmill it should be found by future experiments in magnitude to answer the purposes here described & aimed at. As far as mistaken model is drawing it must undoubtedly be considered as a disadvantage in point to the arts; for if a mill requiring its power from the irregular winds of heavy storms can be self regulative by the centrifugal force, it is a valuable quality in its nature during all seasons when the wind is sufficient

from the communication motion of the circular saw frame and effect them readily & conveniently. It is but just therefore if the aforesaid frame has never before been applied to such work, that the inventor [illegible] appropriate the particular useful power to the purpose. Should it be deemed [illegible] an exclusive right to the benefit arising from the application of that power in all the various manners in which it may be applied to the purpose of regulating the motion of timber readily & [illegible] when they be [illegible] for giving motion to the cutting frame or saw in Boats &c. for the purposes of sawing shore Boats, of loading and discharging vessels, and numerous other useful purposes to which such mills may be applied if those in magnitude shall be found to possess the properties of the invention model in which case this mill will be capable of being applied to any kind of work in which a mill can be successfully used. Some parts of the above described mill are designed for convenience only, and not being necessary to its use, they may be omitted of the construction chosen, for example, the frame is designed only to secure the internal machinery from storms &c may be omitted entirely, or may be added at any time subsequent to the building of the mill. The cords which communicate with the leaders and from the leaders may be omitted, as they are only designed to reduce the number of the back wings. The wings may be made solid without leaves. The wheel turning on a horizontal axis, and this may be the form when this invention is applied to the construction of smoke jacks - to which the principles are equally applicable as to any other purpose. The eccentric circle may be immovably fixed to the shaft. The centrifugal regulators become unnecessary and must be omitted when the power is uniform as a current of water or. The draught or current of air in a chimney &c. The double centred mill is liable subject to many variations in construction suitable to the various purposes to which it may be applied. The original principles still remaining the same.

The drawings accompanying this description are not laid down by any scale of measurement, because the forms sizes and proportions of the whole and its parts may be indefinitely varied. Small [illegible]

24 Art. 7

of this mill which for make of flour use, and the use or remarks of a chimney. The arms may be fixed with shaft and the shaft may be made with Mandrel or Key. The remarks which relate of the arms, and the shaft how they be. The Mills with or without chimney which are fixed to the shaft for doing the required work.

End. 1st

3000 words (Drawing cannot be made a part of the specification)

Examined